

## *Amendments*

### Amendments to the Specification:

Please replace paragraphs starting on line 9 of page 10 and ending on line 1 of page 11 with the following paragraphs:

al A blackboard system can be at its simplest level an object oriented database. However, the blackboard system is different from a normal database in that it can initiate processing based on the data stored in it in order to solve a specific type of problem. In general a Blackboard system 100 can be separated into three distinct components: the Data 102 (the information written on the metaphorical blackboard), the experts 126 (the scientists), and the controller 118 (the controller), see FIG. 1A.

#### *Data*

Referring now to FIG. 1A, the data of blackboard system 100 is the information used to solve a problem, and is composed of the original data, plus all data deduced during the problem solving process. The data can be grouped into different subsets that can share a common characteristic; these subsets are each referred to as a *blackboard* 104-110 within the present disclosure. Thus, data 102 of a blackboard system 100 is stored on a series of *blackboards* 104-110. In the blackboard system 100 in exemplary embodiment of the present invention, there are several examples of these smaller *blackboards* 104-110. Some of the exemplary blackboards hold the output of the experts 126 while others contain information pertaining to the recognition system's own inner workings.

Please replace the bridging paragraph of pages 11-12 with the following paragraph:

Q2 The exemplary *blackboards* 104-110, which contain information internal to the recognition process, are separated into four main types: relation 108, quad 106, belief-model 104, and expert-status 110. The relation *blackboard* 108 can contain information deduced by the spatial relation subsystem 116. The spatial relation subsystem is responsible for determining how different objects returned by the experts 126 are related to each other. In an exemplary

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embodiment, there can be seven types of spatial relations being determined such as, e.g.,: North, South, East, West, Contains, Contained by, and Adjacent to. Each time a new object is instantiated in one of the object class *blackboards*, the belief model 104 can be ~~is~~ used to determine ~~with which~~ other object classes 102 with which it may have significant spatial relations and what those relations might be. Each possible relation checked and the details of any discovered relationships can be stored in the relation *blackboard* 108. It is also possible in another exemplary embodiment to add new relations to the spatial relation subsystem 116 beyond the seven currently defined.

Please replace the paragraph on lines 4-12 of page 17 with the following paragraph:

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The controller 118 is made up of code that takes care of choosing which experts 126 are to be executed and of scheduling and executing those experts. It also performs the chores of gathering the input data for the experts, placing the output of the experts on the appropriate object class *blackboards*, keeping the belief network 114 up to date and of checking for duplicate objects. The controller 118 makes extensive use of the belief model 104 to make decisions governing which experts can be run and when to run them. The belief model 104 is also used by the controller 118 to update the belief network 114 and to control the spatial relations processing 116. The controller 118 can be viewed as having three distinct parts: the object controller 120, the expert controller 122 and the time division multiplexer (TDM) 124.

Please replace the paragraphs starting on line 9 of page 18 and ending on line 7 of page 19 with the following paragraphs:

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The object controller 120 can check for any newly instantiated objects in the object class *blackboards* 102. For each object found it can determine which quadrant (or possibly quadrants) of the image the object resides in and creates appropriate quad facts in the quad *blackboard* 106. Next, using the data stored in the quad *blackboard* 106, the object controller 120 can check to see if the new object is a duplicate object. If so, the duplicate objects can be fused by updating the belief of the original object and deleting the new instance of the object. If no duplicate is found, the belief model 104 can be is used to determine which object classes may have significant

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Conf. | spatial relations to the new object and which of the seven spatial relations are significant. Each qualifying relation can be checked and a fact can be placed on the relation *blackboard* 108 for each relation that is present. Finally, these new relations, if any, can be used to update the belief network ~~104~~114. Once all new objects have been processed control can be passed to the expert controller 122.

| The expert controller 122 ~~check~~-can check to see if there are any experts 126 who can be started based on the data currently available on the object class *blackboards*. The stub function for each expert qualified to start can be called. The stub function can invoke the process to start the expert, e.g., on a remote processor, gather and deliver the expert's input and create an entry in the active experts list for the expert. The entry in the expert-status *blackboard* 110 for the expert can be updated to show that the expert has been run. Once all qualified experts have been started, if any, a check can be made to see if the active experts 130 list is empty. If the list is empty, processing has finished and the recognition system can return its final output; otherwise control can be returned to the TDM 124, starting the loop again.

Please replace the paragraph starting on lines 14-19 of page 27 with the following paragraph:

### ***Learning System Architecture***

95 | The learning system 300 comprises the processes that generate the belief model 104 used in the recognition blackboard. The input to the learning system 300 is a set of image ground truth data files 302, the actual images themselves need not be given since at no time are any of the experts ~~120~~126 ever executed. The output of the system will be the belief model 104 itself.